Video Lecture #1 – (Part 1) 2nd Semester Final Review: Electrostatics, Electric Field, Electric Potential Difference

Thank You, Puja Patel, for these notes.

## Chapter 17

Law of charges = like charges repel, unlike charges attract

$Q = ne$ n = # of electrons $e = \pm 1.60 \times 10^{-19}$ C

$F_e = \frac{kq_1q_2}{r^2}$ Force is a vector ($F_g$ is negligible for atomic particle)

$E = \frac{F_e}{q}$ E = electric field dimensions = $\frac{N}{C}$ or $\frac{V}{m}$ *general equation ($\vec{E}$)

$E = \frac{kq}{r^2}$ electric field around a point charge

## Chapter 18

$\Delta PE_{ele} = -qE\Delta d$ $\Delta d$ = displacement parallel to electric field *constant electric field

$PE_{ele} = \frac{kq_1q_2}{r}$ $PE_g$ is negligable for atomic particles

$\Delta V = \frac{\Delta PE_{ele}}{q}$ $\Delta V$ = Electric Potential Difference dim = $\frac{J}{C} = V$ *general equation

$\Delta V = \frac{kq}{r}$ *around a point charge infinetly far away $\Delta V = -E\Delta d$ general

Video Lecture #2 – (Part 2) 2nd Semester Final Review: Current, Resistance and Circuits

## Chapter 19

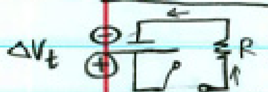
$I = \frac{\Delta Q}{\Delta t}$ current *dimensions = A, amp, base SI $\left(\frac{C}{s}\right)$

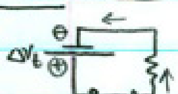
Resistances, R; $R = \frac{\Delta V}{I}$ dimensions = Ω, ohm $\left(\frac{V}{A}\right)$

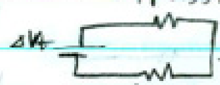
$\Delta V = IR$ $P = I\Delta V = I^2R = \frac{\Delta V^2}{R}$ watts $\left(\frac{J}{s}\right)$

## Chapter 20

short circuit a circuit w/ very low resistance, bypassing the load


open circuit


closed circuit


in series

$R_{eq} = R_1 + R_2 + R_3 \ldots$

$I_t = I_1 = I_2$ $\Delta V_t = \Delta V_1 + \Delta V_2 + \Delta V_3 \ldots$


in parallel

$R_{eq} = \left(\frac{1}{R_1} + \frac{1}{R_2} + \ldots\right)^{-1}$ $\Delta V_t = \Delta V_1 = \Delta V_2$

$I_t = I_1 + I_2$

Video Lecture #3 – (Part 3) 2nd Semester Final Review: Magnetism, Magnetic Force

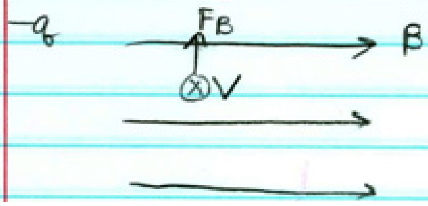
Chapter 21 Law of Poles: like Poles repel, unlike Poles attract

$B$ = Tesla, T $\left(\frac{N}{A \cdot m}\right)$

a B Field $F_B = qvB\sin\theta$ $\theta$ = angle between V & B

**Right Hand Rule!**

$F_B = ILB\sin\theta$ $\theta$ = angle between I & B




*moves in circle

$\Sigma F_{in} = F_B = ma_c$

Video Lecture #4 – (Part 4) 2nd Semester Final Review: Light, Optics, Mirrors, Lenses, Interference

Chapter 14

c = speed of electromagnetic waves = $3.00 \times 10^8 \frac{m}{s}$

Reflection of light $\theta_i = \theta'$ i = incident angle, ' = reflected angle *relative to the normal

f = focal length $f = \frac{R}{2}$ R = radius of curvature *Ray diagram

p = object distance q = image distance $\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$

convex: upright, reduced, virtual, $f < 0$

Chapter 15

n = index of refraction $n = \frac{c}{v}$ $\frac{\text{in vacumm}}{\text{in medium}}$ $n \geq 1$

as n ↑, light bent towards normal

Snell's Law $n_i \sin\theta_i = n_r \sin\theta_r$ diverging lense = upright, reduced, virtual, $f < 0$

$\theta_c$ = critical angle $\sin\theta_c = \frac{n_r}{n_i}$ $\theta_c \leq \theta_i$ $\theta_c = \theta_i$ ⇒ total internal reflection

Chapter 16

d = distance between the diffraction lines / slit spacing

$d\sin\theta = m\lambda$ bright fringe maximum

$d\sin\theta = (m + \frac{1}{2})\lambda$ dark fringe minimum

$m = 0, \pm n$

$0^{th}$ order dark fringe